

REMARKS

Claims 1-12 are pending under examination. In the March 11, 2004 Action, the

Examiner:

- 1) Approved the preliminary amendment to correct inventorship from Renzo Dal Molin to Thierry Legay;
- 2) required a new title that more clearly indicates the invention to which the claims are directed;
- 3) rejected claims 7-12 under 35 U.S.C. § 112, second paragraph, as being indefinite for including a method step in device claim 7, and suggested using means plus function language;
- 4) rejected claims 1-12 under 35 U.S.C. 102(f), based on inventorship in that the inventor named in the foreign priority document (FR 00 16906) is inconsistent with the inventorship (as amended) of this application;
- 5) rejected claims 1-2 and 4 under 35 U.S.C. 102(b) as being anticipated by Baura U.S. 6,058,325 ("Baura");
- 6) rejected claims 3, and 5-6 under 35 U.S.C. 103(a) as being unpatentable over Baura; and
- 7) rejected claims 7-12 under 35 U.S.C. 103(a) as being unpatentable over Baura in view of Busch et al. U.S. 6,304,781 ("Busch").

In this response, applicant has amended the title, amended claim 1 to correct an editorial error, amended claims 7, 10 and 11 in view of the Examiner's rejections under §112, and respectfully traversed the Examiner's rejections under § 102 and 103. Reconsideration of this application is respectfully requested in view of the foregoing amendments and the following.

The § 112 Rejections Should Be Withdrawn

In response to the Examiner's rejection under § 112, applicant has had reviewed the pending claims and amended claims 7, 10 and 11 to recite the functional language in means plus function form, consistent with the Examiner's suggestion with respect to claim 7. These amendments are not believed to alter the scope of the subject matter defined by the originally filed claims, and in any event do not narrow the original scope. Rather the amendments correct the self-evident errors in claim drafting as appreciated and noted by the Examiner. Accordingly, we respectfully submit that the Examiner's rejections of claims 7-12 under 35 U.S.C. § 112, ¶ 2 are now moot and should be withdrawn.

The § 102(f) Rejection Should be Held in Abeyance

In response to the Examiner's rejection under 35 U.S.C. § 102(f), applicant submits herewith a true and correct copy of the change of inventorship document submitted to the French Patent Office, to make there the change of inventorship already made in this application. Accordingly, we respectfully submit that the Examiner's rejection under § 102(f) based on inventorship should be withdrawn. If not, applicant respectfully requests that the rejection be held in abeyance until applicant's assignee can obtain and submit a certified copy of documentation indicating the change of inventorship of the French priority application No. 0016906 after it is available from the French Patent Office.

The Prior Art Rejections Based On Baura Should Be Withdrawn

We respectfully traverse the Examiner's rejections based on Baura taken alone and in combination with the noted secondary reference, Busch.

A. Applicant's Invention

The present claims are directed to a process and apparatus for the measurement of the complex impedance of a lead for an active implantable medical device, in particular a pacemaker, defibrillator and or cardioverter. This includes producing a stimulation pulse by the

discharge on the lead (10) of a tank-capacitor (22) of the device (20), charged beforehand to a given voltage level, measuring the voltage variation ($V(t)$) at the terminals of the tank-capacitor during the discharge, and determining the lead impedance (Z_s) from the voltage thus measured. The measurement stage includes sampling at least three successive values of the voltage at the terminals of the tank capacitor, and the determining stage includes the separate determination of the resistive (R_s) and/or capacitive (CH) components of the complex impedance of the lead from the aforesaid at least three sampled values of voltage thus obtained.

B. Baura

The Baura reference is directed to measuring impedance across a load by a technique that does not teach or suggest the subject matter applicant has claimed as his invention. In contrast to applicant's technique, Baura uses an excitation voltage $V_{in}(t)$ having a frequency (about 1-2 Hz) and a measured voltage $V_{out}(t)$ sampled at a digitization rate (e.g., 1000 Hz) orders of magnitude higher than the excitation voltage frequency, to estimate a transfer function therebetween. Then, once the transfer function is estimated, it can be equated to a resistor-capacitor circuit model and an estimate derived for the actual resistance and capacitance components of the true impedances.

Although the Examiner correctly notes that the output voltage $V_{out}(t)$ is sampled and digitized at a rate that literally has "at least three successive values" (Office Action, p. 3), Baura nevertheless does not anticipate either claim 1 or claim 7 because it does not teach or suggest "discharging the tank-capacitor to produce a stimulation pulse on the lead," "measuring a voltage variation ($V(t)$) at the terminals of the tank-capacitor during said discharge" and "determining separately a resistive component (R_s) and a capacitive component (CH) of the impedance of the lead from said at least three sampled values of voltage" as required by claim 1, and as similarly required by claim 7 (and the claims respectively depending therefrom). Specifically, the Baura disclosure requires use of both the input and output voltages to create a transfer function from which estimates of the true impedances are derived, and thus does not use the at least three success values of voltage to determine separately a resistive and a capacitive component as required by applicant's invention.

Further with respect to claims 3 and 9, we respectfully submit that the Examiner's statement that the timing of the at least three successive samples is an "obvious design choice" (Office Action, p. 4) is incorrect. Applicant's invention provides the ability, with just three voltage samples taken from a discharging tank circuitry, to reliably obtain a resistive and capacitive impedance measurement by timing the three samples to have the third sampling time occur at a time following the second sampling time that is on the order of twice the duration between the first and second sampling times. See, e.g., claims 3 and 9. This is nowhere shown or suggested in the prior art of Baura which instead teaches the need to obtain hundreds, if not thousands of digitized voltage samples (at fixed intervals) to, by its fundamentally different technique, create a transfer function from which complex impedance calculations can be derived.

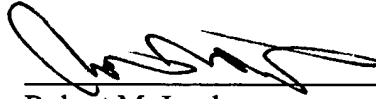
Applicant, however, is believed to be the first to have recognized the advantages of the particular timing of the at least three samples as set forth in claims 3 and 9, and also the first to have disclosed this particularly advantageous implementation of the invention involving a non-iterative solution. See applicant's Specification at pp. 7-8. Accordingly, for this additional reason, the Examiner's obviousness rejections of claims 3 and 9 should be withdrawn.

The secondary reference Busch does not cure the above-noted deficiencies of Baura.

CONCLUSION

For the foregoing reasons, applicant respectfully submits that he has made a patentable contribution to the art. Reconsideration and allowance of this application in light of the foregoing are respectfully requested.

Respectfully submitted,



Robert M. Isackson
Reg. No. 31,110
Attorney for Applicant
ORRICK, HERRINGTON & SUTCLIFFE LLP
666 Fifth Avenue
New York, New York 10103-0001
Telephone: (212) 506-5280
Facsimile: (212) 506-5151